REMARKS

Applicant amended claims 1, 43 and 44 and cancelled claims 2-5 and 7. Claims 1, 8-31, 33-36, 39-41, and 43-56, of which claims 1, 31 and 35 are in independent form, are presented for examination.

Claims 1, 3-5, 7-10, 16-19, 30, 33, 42-45, and 56 are rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0 962 997 (Friend) in view of U.S. Patent No. 4,177,157 (Adams). Claims 3-5 and 7 have been cancelled, and claim 42 was previously cancelled, making the rejection of those claim moot.

Claim 1 requires a cathode including between about 6% and about 7% of heat-treated carbon fibers by weight. Friend does not teach using more than 5.14% of carbon fibers. (See Table II, page 7 of Friend, in which the fibrils make up between 4.02 and 5.14% of the cathode mix.) Friend does not disclose a cathode having about 6% of carbon fibers. The highest level disclosed by Friend (5.14% carbon fibers) is 15% less than 6%. Thus, Friend does not disclose or suggest a cathode having the claimed carbon fiber levels.

Adams, on the other hand, only teaches the use of between 9.2% and 12% fiber particles in conjunction with about 14% to about 18% graphite powder, and that level is disclosed in the context of a nickel hydroxide electrode. As such, neither reference discloses or suggests a cathode having between about 6% and about 7% carbon fibers as expressly recited in claim 1. Thus, even if these references could be properly combined, which Applicant does not concede, the combination fails to disclose or suggest each and every element of claim 1, and the rejection of the claim should be withdrawn.

As to the remaining independent claims, claims 31 and 35 require a cathode including between about 6% and about 10% of heat-treated carbon fibers by weight. Given that each of Friend and Adams discloses a range of fiber particles that do not overlap, and given that the electrode types differ, one of skill in the art would not be motivated to employ the 9.2-12% carbon fiber levels of Adams in the batteries of Friend. Initially, it is well known in the art that the design of a cathode of a battery requires the balancing of the desire to have increased conductivity with the desire to have the maximum amount of active material, so as to have the maximum possible battery capacity. One of skill in the art would not be led to increase the graphite levels of Friend simply because Adams teaches the use of higher levels of graphite, as

the resulting loss of battery capacity would produce a negative effect. Also, given that the electrodes of Adams are nickel hydroxide electrodes and not magnesium oxide electrodes as in Friend, any design parameters of Adams do not necessarily translate into optimum conditions for the electrode of Friend. Further, given that Adams utilizes both graphite powder and graphite fibers, one of skill in the art would not be able to attribute any improved performance characteristics to the carbon fibers standing alone.

For at least these reasons, the rejection of these claims should be reconsidered and withdrawn.

Claims 16-18, 35, and 43-44 require that the carbon fibers be heat treated. Neither Friend nor Adams discloses heat treated carbon fibers. The Examiner has cited Friend at page 6, line 58 as meeting this limitation. That portion of Friend, however, refers only to the formation of the carbon fibers, not to any subsequent heat treatment of the fibers. As identified in the present specification at page 5, lines 10-16, the heat treatment is a treatment performed on the already-formed fibers to convert a carbon layer that forms on the surface of the fibers during fiber synthesis. Thus, to meet the heat treatment limitation the application of heat must (a) occur after the formation of the fibers; and (b) be of a temperature sufficient to convert carbon to graphite. The Friend process uses a temperature of only 680°C, not sufficient to convert carbon to graphite, and the heat is applied only during the formation of the fibers. As such, it does not disclose the heat treatment of either claim 16 or claim 35. Further, given that the identified temperature is only 680 °C, Friend clearly does not disclose or suggest the specific temperature limitations of claims 17-18 and 43-44. For at least these additional reasons, claims 16-18, 35, and 43-44 are patentable over these references.

Under 35 U.S.C. § 103(a), claims 11, 12, and 35-37 are rejected as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 4,948,484 (Andersen); claims 13-15, 20-22, 39-41, 46-48, and 50 are rejected as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 4,923,637 (Yagi); claims 23 and 49 are rejected as being unpatentable over Friend in view of Adams and Yagi and further in view of Lafdi and Wright, Carbon Fibers from Handbook of Composites (Lafdi); claims 26 and 52 are rejected as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 4,005,183 (Singer); claim 34 is rejected as being unpatentable over Friend in view of Adams and

further in view of Lafdi and Singer; claims 24, 25, 50 and 51 are rejected as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 6,506,355 (Glasgow); claims 27 and 53 are rejected as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 5,482,798 (Mototani); claims 28 and 54 are rejected as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 4,777,100 (Chalilpoyil); and claims 29 and 55 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Friend in view of Adams and further in view of U.S. Patent No. 6,287,730 (Callahan).

Claim 37 has previously been cancelled, making its rejection moot.

Each of the remaining claims is allowable for at least the same reason that claims 1, 31 and 35 are allowable, as well as for additional reasons relating to the additional limitations contained in the claims. For example, claims 11 and 35, rejected over Friend in view of Adams and further in view of Andersen, require between about 82% and about 92% of cathode active material by weight in the cathode. These claims, by requiring a minimum of 82% active material, leave only 18% for additional components. But Adams, the reference cited for providing more than 5% carbon fibers, requires a minimum of 6% PTFE binder for a nickel electrode (the electrode for which the levels of carbon fibers can be determined in Adams), leaving only 12% available for graphite. As graphite powder comprises half again as much of the graphite as does fibers, this leaves a maximum of 4.8% carbon fibers, below the claimed limitation.

Further, Anderson does not provide the missing limitation of between about 82% and about 92% active material. Anderson is directed to making an electrolyte/MgO_2/carbon combination. Each of the disclosed ratios of active material to carbon in Anderson relate only to such a combination, and offer no evidence what percentage the active material might be when subsequently incorporated into an electrode. See, e.g., Adams at col. 3, lines 50-60 (identifying the inclusion of PTFE binder at levels of at least 3%) and Friend at page 7, Table II (identifying three cathode examples in which the active material and carbon total only 57.6%, 57.2%, and 55.2% of the total cathode mix). Absent some indication of the levels of other components that go into the cathode, Anderson fails to disclose or suggest a cathode having from about 82% to about 92% active material. Anderson fails to remedy the deficiencies of Friend and Adams, and Adams, if paired with a reference that did disclose the additional limitations recited in these

claims, would then fail to disclose the required carbon fiber levels. For at least these additional reasons, claims 11, 12, and 35-36 are patentable over these references, and this rejection should be withdrawn.

Claims 29 and 55 require a surfactant selected from the group consisting of polyvinyl alcohol, ethylene-vinyl alcohol, and polyvinylbutyrol. Callahan is cited by the Examiner as teaching the use of ethylene-vinyl alcohol as a surfactant. Callahan, to the contrary, discloses the use of a surfactant *in combination* with ethylene-vinyl alcohol – the ethylene-vinyl alcohol is identified by Callahan as distinct and in addition to the surfactant. See, e.g., col. 1, lines 55-60 (identifying the Callahan article as including a coating containing a surfactant *and* an ethylene vinyl alcohol copolymer, and further indicating that the two can be applied separately). Callahan identifies exemplary surfactants at col. 2, lines 15-25, and ethylene-vinyl alcohol is not included in that listing. For the additional reason that none of the references disclose a surfactant selected from the group consisting of polyvinyl alcohol, ethylene-vinyl alcohol, and polyvinylbutyrol, claims 29 and 55 are believed patentable, and Applicants request withdrawal of the rejection of these claims.

For at least the reasons discussed above, Applicant believes the claims are in condition for allowance, which action is requested.

Please apply any charges or credits to deposit account 06-1050, referencing attorney docket number 08935-240001.

Respectfully submitted,

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